

Description of Related Art

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BACKGROUND OF THE INVENTION
Field of the Invention**Method for producing printed surfaces**

This
[The] invention relates to a method for producing printed surfaces
[according to the preamble of claim 1] which fluoresce under
ultraviolet (UV) light.

It is known to use fluorescent dyestuffs in combination with normal dyestuffs for various effects.

Fluorescent dyestuffs are mixed with normal dyestuffs [in order] to make the [colour] ^{color} brighter in daylight. The dyestuffs which are non-visible or fluoresce under ultraviolet light (UV light) are also [especially] ^{particularly} used in the theatre for special effects, their dramatically fluorescent properties under UV illumination being exploited.

It is known that for use in signs and in advertising, adhesive, fluorescent foils are cut into letters and/or figures, emblems, [logogrammes] ^{logos} and the like, which for example are stuck to a window pane or to a corresponding pane or panel made of glass, Plexiglas or a similar translucent material that [which consequently] forms a carrier for signs or advertising.

In order to impart the desired, glowing, neon-like effect to the sign or advertisement, it must be illuminated by [means of] a so-called non-visible or black light.

An adhesive, fluorescent foil with a translucent layer, which is impermeable or substantially impermeable for UV radiation, is disclosed in WO-A-93/01581.

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A disadvantage in the use of such adhesive, fluorescent foils in the form of cut-to-size letters, figures, emblems, [logogrammes] ^{logos} and the like, in signs or in advertising [resides in the fact] ^{is} that merely letter features, logos and uniform [colour] ^{color} areas can be highlighted, [in that] ^{and} photographic reproductions and pictures in general cannot [however] be depicted in

[colour]^{color} gradations and transitions. Furthermore, it is disadvantageous that numerous foil characters^{or} [patterns] must be fabricated and cut in complex individual steps and the individual, monochrome foil patterns must be positioned and glued by hand within the scope of the actual formation of the sign or advertising surface.

A method is known from [US-A-4 652 464] ^{United States Patent 4,652,464,} for printing art or advertising graphics using visible and/or non-visible, fluorescent dyestuffs and non-fluorescent dyestuffs in multiple print series of [colours]^{colors}, each print series being implemented with one predetermined print pattern. Art and advertising graphics are [thereby] produced in the printing process with the property of depicting an object with a smooth transition under distinctly different lighting conditions when the object is observed under illuminations which vary between daylight or incandescent light up to UV light.

In this method visible and/or non-visible, fluorescent dyestuffs are used during the printing process, which are applied to [the] previously selected areas of the picture in a predetermined pattern, in order to obtain the desired [colours]^{colors} under normal light or daylight and in order to amalgamate these fluorescent dyestuffs with the non-fluorescent dyestuffs under UV light, so that the fluorescent dyestuffs are blended or concealed under normal light.

The relative ratio and the [colours]^{colors} and different [colour]^{color} tones of the non-fluorescent dyestuffs and of the visible and non-visible, fluorescent dyestuffs are [hereby] selected in advance, in order to achieve a gradual, fine transition on the picture when it is observed under light conditions which alternate between daylight and UV light, or in order to blend or shade the effect, or in order to reduce the intensity of the fluorescent dyestuffs in specific areas so as to achieve a more natural and gentler effect under UV light.

The disadvantage of the method according to [US-A-4 652 464] resides in the fact] that the printing process must be modified in a complex manner in order to include the application in addition of fluorescent dyestuffs [and that a] printing process is required which is structured in many printing steps with the application of a multiplicity of specific fluorescent dyestuffs and, furthermore, predetermined areas with gradations both of the normal colors [colours] and also of the non-visible, fluorescent dyestuffs must be printed, in order [thus] to examine the desired effect of not impairing the fluorescent dyestuffs, which are applied to the picture, by the normal daylight dyestuff patterns.

[Finally, a] ^A method for producing surfaces which are luminous at night is known from ^{German Patent Reference} DE-A1-196 20 090, in which a wire printer method with luminous [colours] ^{colors} red, green, blue is used so that the printed surface is luminous at night. In a second print run with translucent [colours] ^{colors} the motif depicted on the printed surface can also be made visible in daytime. The second print run [thereby] serves at the same time as UV and reaction protection of the luminous [colours] ^{colors}.

SUMMARY OF THE INVENTION

[The] ^{One} object (underlying the present] ^{of this} invention is to [avoid] ^{provide a method that avoids} the [hitherto] required multiplicity of printing steps and in particular the complex adjustment of the fluorescent [colours] ^{colors} in the printing process.

This object is achieved by [means of the] features ^{of this invention as described in the claims and this specification} [mentioned in claim].

Particular requirements or additional steps are [hence] no longer required.

^{Non-visible} [Hitherto, non-visible,] fluorescent dyestuffs were not used in the mentioned form in the four-^{color} and multi-^{color} [colour] ^{color} printing method. The advantages of ^{this} [the] invention reside particularly in the fact that, instead of a multiplicity of printing steps using non-visible, fluorescent print [colours] ^{colors} and paints, the normal practice printing steps are implemented [and, in]. In this connection, as also with four-^{color} and multi-^{color} [colour] ^{color} printing with the conventional primary [colours] ^{colors}, in the lithographic composition an

authentic pictorial reproduction is effected by [means of] targeted alteration of the [colour]^{color}/parameters of each individual print [colour]^{color} and in the printing itself a fine adaptation of the perceived^{color} [colour] is effected by [means of] an alteration of the applied^{color} [colour] quantity. This alteration method which is known to any printer can immediately be implemented without special training or other know-how in a non-problematic manner.

[Further expedient and advantageous embodiments of the invention emerge from the sub-claims.]

In one embodiment **DESCRIPTION OF PREFERRED EMBODIMENTS**

[An expedient development] of [the]^{this} invention, [provides that there are] added to the print [colours]^{colors} and/or paints organic pigments in the range of 15% to 20%, fluorescent pigments in the range of 5% to 30% and optically active substances in the range of 0% in one kilogram of [colour]^{color}. [By means of] with these measures, a very weak luminosity of the [colours] is achieved.

With [By means of] the measures [of] ^{set forth in} claim 3, a weak luminosity of the [colours]^{colors} can be achieved, [whilst by means of] ^{and with} the measures [of] ^{set forth in} claim 4, an average luminosity of the [colours]^{colors} can be achieved. [By means of] ^{with} the measures [of] ^{set forth in} claim 5, a strong luminosity of the [colours]^{colors} is achieved and finally a very strong luminosity of the [colours]^{colors} is achieved [by means of] ^{with} the measures of claim 6.

This [The] invention also extends to a single [colour]^{color} printing method. In the case of print [colours]^{colors} it relates to highly [colourfast] print [colours]^{colors}. Special [colour]^{color} tones can likewise be taken into account. ^{color fast}

By printing with fluorescent [colours]^{colors}, [it is achieved that] the printed reproduction corresponds to the model in its [colourfastness]^{color-fastness} and [colour]^{color} gradation in daylight and appears as a completely normal poster or advertising surface, though with the effect that by using the fluorescent dyestuffs even in daylight greater luminosity of the [colours] is already ^{colors}

expressed, so that the reproduction strikes the observer substantially sooner than a conventional [four colour] print poster.

four-color

As the most distinctive advantage, [it emerges that] the picture which is printed with fluorescent ^{colors} [colour], the advertising graphics, advertising surface or the like, glows entirely of its own accord at night under UV light with an authentic [colour] ^{color} reproduction in comparison with the daylight effect, comparable to the brilliance of a television picture, though even more effectively in all [colour] ^{color} gradations. ~~[such that three]~~ ^{Three} dimensional effects are produced in the reproduction with the luminosity of a slide projection and a deep three-dimensional effect is achieved, so that [it is achieved that] the observer pays particular attention. Furthermore, the picture surface which is applied to a dark background glows of its own accord at night under UV illumination, since the UV light source, contrary to white light, throws no scattered light.

The printing process according to [the present] ^{this} invention comprises conventional methods and materials, [the] ^{this} invention [constituting] in particular the combination of the function of the elements. ^{forming}

The ratio of a percentage mixture of fluorescent pigments and non-fluorescent pigments varies on the one hand according to the individual ^{colors} [colours] or [colour] ^{color} tones, the different print stocks and, on the other hand, according to the printing methods used, for example the offset or the screen print method. The print [colours] ^{colors} can be described as follows: conventional ^{colors} primary [colours] and special [colour] ^{color} tones in combination with organic pigments, fluorescent pigments, and optically active substances, the mixture of organic pigments, fluorescent pigments and optically active substances being effected in different percentage ratios according to the printing method, according to primary [colours] ^{colors} and special tones and according to print stocks.

A preferred standard value for the ratio is given according to one embodiment of ^{this} [the] invention in that the pigment addition to one kilogram of [colour]^{color} in the case of organic pigments is in the range of 0.5% to 5%, in the case of fluorescent pigments in the range of 15% to 80% and in the case of optically active substances in the range of 0.5% to 1%.

^{This} [The] invention is described in greater detail by [means of] the following example.

Possibly, a photographically reproduced western city silhouette is to be printed, ^{with} the back of a person being [supposed to be] reproduced in the foreground.

This motif is produced in the [four colour]^{four-color} printing method by using non-visible, fluorescent print [colours]^{colors} and paints, the [colour]^{color} gradation being achieved, in the printing process step of the lithographic composition, as also in the case of the conventional [four colour]^{four-color} printing method, corresponding to the model by means of alteration of the [colour]^{color} parameters and a fine adaptation of the perceived [colour]^{color} being effected in the print itself by means of a corresponding increase or decrease of the ^{color} [colour] quantity applied in the printing. The adjustment occurs taking into account the use of fluorescent dyestuffs, which do not correspond to the Euroscale norm, preferably by eye.

The advertising surfaces which fluoresce by means of the proposed method can be produced for any purpose, also therefore for packagings which are used with UV illumination in the gastronomic sphere.